# TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM FINAL CRUISE REPORT

M/V *Bluefin* TA-14-03

Area: Equatorial Pacific: 8°N 95°W to 0° 95°W and 0° 110°W to 8°N 110°W

**Itinerary**:

TA-14-03-BLFN DEP June 10, 2014, Caldera, CR

ARR July 9, 2014, Honolulu, HI

#### CRUISE DESCRIPTION

The Tropical Atmosphere Ocean (TAO) array consists of 70 buoys utilizing a taut line mooring configuration used to mount data collection sensors for climate research purposes. Fifteen buoys are serviced by JAMSTEC and the remaining 55 buoys from 95°W longitude to 165°E longitude are serviced by National Data Buoy Center (NDBC). Repair and maintenance of the buoys is performed by NDBC contracted personnel on an annual basis utilizing the NOAA Ships and other contract vessels. The buoys' deployment lifecycles are up to 18 months to ensure at least one year of data collection can be completed.

#### **NDBC Points of Contact**

NDBC Operations Branch Chief NDBC Operations Manager

Steve Cucullu Jeff Jenner

National Data Buoy Center National Data Buoy Center

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228-688-3804 228-688-2784

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#### TAO Cruise Objective and Plan:

The objective of this cruise was the maintenance of the TAO Array along the  $95^{\circ}W$  ( $8^{\circ}N - 0^{\circ}$ ), and  $110^{\circ}W$  ( $0^{\circ} - 8^{\circ}N$ ) meridians.

The scientific complement for the cruise embarked at Caldera, CR on June 9, 2014. The ship departed on June 10, 2014 and conducted operations as listed in Section 2.1. The ship arrived in Honolulu, HI on July 9, 2014.

### 1.0 **PERSONNEL**

### 1.1 CRUISE LEAD AND PARTICIPATING SCIENTISTS:

Cruise Lead: William Thompson.

# Participating Scientists:

Name	Gender	Nationality	Affiliation
William Thompson	M	US	NOAA/NDBC
Lee Tretbar	M	US	NOAA/NDBC
Rodney Watkins	M	US	NOAA/NDBC

### 2.0 **OPERATIONS**

# 2.1 <u>TAO Data Recovery Summary</u>

Mooring Operations conducted are shown in the tables below. The following provides details on the data recovery efforts for the buoys serviced. All noted times in this summary report are Coordinated Universal Time (UTC):

**Cruise Summary** 

Buoy Site: 8N 95W ATLAS				
Mooring Operation: Recovery		Mooring ID#: QM	Mooring ID#: QM018A	
<b>Deployed Location:</b> (	08 00.942N/ 94 57.416W	<b>Deployed Date: 4/7</b>	7/2013	
<b>Recovered Location:</b>	08 00.9N/94 56.4W	<b>Recovered Date:</b> 6	Recovered Date: 6/13/2014	
Sensors/Equipment L	ost at Sea: All Met, Tu	be, T180, Release		
Sensors Damaged/Fou	uled: SSC, T20, T40			
<b>Fishing/Vandalism:</b> T spool of nylon.	Tower missing, long line	cuts in nilspin, and long	line found on second	
Sensors/Tubes Downl	oaded: All recovered se	ensors downloaded succe	essfully.	
<b>General Comments:</b> 7	<b>General Comments:</b> The acoustic release malfunctioned and the mooring was severed using a			
line cutter.				
Site Sensor Failures	<b>Date Data Flagged</b>	Why Data Flagged	Field Service	
			Observations	
Buoy	10/31/13	Data missing, transmit failure	Tower lost at sea	
ATMP/RH	10/27/13	Data too low	Lost at sea	
SSC	09/20/13	Data missing	Fouled	

<b>Buoy Site:</b> 8N 95W REFRESH	Mooring Depth: 3683m		
Mooring Operation: Deployment	Mooring ID#: DM068A		
<b>Deployed Location:</b> 08 01.13N /94 56.76W	<b>Deployed Date:</b> 6/13/2014		
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Routine deployment			

<b>Buoy Site:</b> 0 110W ATLAS FLUX	
Mooring Operation: Recovery	Mooring ID#: QM015A
<b>Deployed Location:</b> 00 02.113N/109 54.521W	Deployed Date: 3/29/2013
<b>Recovered Location:</b> 05 20.9N/93 04.7W	Recovered Date: 6/14/2014
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**Sensors/Equipment Lost at Sea:** ADRIFT, Lost all below 10m.

Sensors Damaged/Fouled: SWR & LWR were covered with cloth and plastic by vandals;

SSC, T05, T10 fouled.

**Fishing/Vandalism:** BUOY ADRIFT, heavy steel cable attached to buoy pad eye, camera & Rad sensors covered with plastic and cloth, mooring caught in small amount of long line, Nilspin ripped in half at about 11m.

Sensors/Tubes Downloaded: All Recovered sensors were downloaded successfully.

**General Comments:** None

Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
Buoy	04/14/14	Adrift outside data grid	Nilspin ripped at 11m
SSC	07/29/13	Data missing	Fouled
T13, T25, T28, T45, T48, T83, TC120, T123	03/29/13	Data missing	Lost at sea
TC20	04/05/14	Data missing	Lost at sea
TC40	05/20/13	Data missing	Lost at sea
TC60	05/23/13	Data missing	Lost at sea
TC80	01/21/14	Data missing	Lost at sea
T100	06/19/13	Data missing	Lost at sea
T140	06/16/13	Data missing	Lost at sea
T180	03/12/14	Data missing	Lost at sea
TP300	04/26/13	Data missing	Lost at sea
TP500	06/04/13	Data missing	Lost at sea
SRAD	10/30/13	Data too low	Covered in plastic
LRAD	10/30/13	Jumped high	Covered in plastic
TC05, TC10	03/29/13	Data missing	Fouled
V10	05/19/13	Data missing	Lost at sea

V25, V45	04/06/14	Data missing	Lost at sea
V80	02/28/14	Data missing	Lost at sea
V120	06/08/13	Data missing	Lost at sea

Buoy Site: 5N 95W ATLAS					
<b>Mooring Operation:</b> F	Mooring Operation: Recovery Mooring ID#: QM017A				
<b>Deployed Location:</b> 04	4 57.46N/95 00.00W	<b>Deployed Date: 4/5</b>	/2013		
<b>Recovered Location:</b> (	)4 57.1N/94 59.9W	<b>Recovered Date:</b> 6/	15/2014		
Sensors/Equipment L	ost at Sea: All met, Cam	era, Tower missing			
Sensors Damaged/Fou	iled: SSC, T20, T40, T60	)			
Fishing/Vandalism: T	Cower gone, long line on	nilspin and nylon.			
Sensors/Tubes Downloaded: All sensors downloaded successfully except T140 and missing					
tube.					
<b>General Comments: N</b>	Vone				
Site Sensor Failures	Site Sensor Failures   Date Data Flagged   Why Data Flagged   Field Service				
Observations			Observations		
Buoy	05/29/13	Data missing,	Tower missing, LAS		
		transmit failure			
T100	05/05/13	Data missing	None		

<b>Buoy Site:</b> 5N 95W REFRESH	Mooring Depth: 3515m	
Mooring Operation: Deployment	Mooring ID#: DM069A	
<b>Deployed Location:</b> 04 57.73N/94 59.635W	<b>Deployed Date:</b> 6/15/2014	
Pre-Deployment On Deck Instrument Failures: 40m, 500m		
Sensors/Equipment Lost at Sea: None		
Sensors Damaged During Deployment: None		
<b>General Comments:</b> The 40m and 500m sensors failed on deck and were replaced.		

<b>Buoy Site:</b> 2N 95W RF	EFRESH				
<b>Mooring Operation:</b> F	tion: Recovery Mooring ID#: DM051A				
<b>Deployed Location:</b> 0	1 54.983N/95 20.205W	<b>Deployed Date:</b> 4/4	-/2013		
<b>Recovered Location:</b> N	N/A	<b>Recovered Date:</b> N	T/A		
<b>Previous Repair Date:</b>	NONE				
Sensors/Equipment L	ost at Sea: All sensors lo	st at sea, Buoy Adrift			
Sensors Damaged/Fouled: N/A					
Fishing/Vandalism: Unknown, Buoy Adrift					
Sensors/Tubes Downloaded: None					
General Comments: Lost at sea					
Site Sensor Failures	Site Sensor Failures   Date Data Flagged   Why Data Flagged   Field Service				

			Observations
Buoy	07/10/13	Transmit failure	Lost at sea
ATMP/RH	04/26/13	Data too high	Lost at sea
Winds	04/07/13	WDIR erratic	Lost at sea

<b>Buoy Site:</b> 2N 95W REFRESH	Mooring Depth: 2822m		
Mooring Operation: Deployment	Mooring ID#: DM070A		
<b>Deployed Location:</b> 01 54.947N/95 20.947W <b>Deployed Date:</b> 6/17/2014			
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: SSC			
General Comments: SSC Failed on deployment and was not replaced.			

<b>Buoy Site:</b> 0 95W REF	FRESH			
<b>Mooring Operation:</b> I	Recovery	Mooring ID#: DM	050A	
<b>Deployed Location:</b> 0	0 05.725S/95 27.748W	<b>Deployed Date: 4/3</b>	Deployed Date: 4/3/2013	
<b>Recovered Location:</b>	NA	Recovered Date: N	I/A	
Sensors/Equipment L	ost at Sea: All sensors l	ost at sea		
Sensors Damaged/For	ıled: N/A			
Fishing/Vandalism: B	uoy adrift			
Sensors/Tubes Downl	oaded: None			
<b>General Comments:</b> I	ost at sea			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service	
Observations			<b>Observations</b>	
Buoy	09/22/13	Transmit failure	Lost at sea	
Winds	04/16/13	WDIR erratic	Lost at sea	

<b>Buoy Site:</b> 0 95W REFRESH	Mooring Depth: 3251m		
Mooring Operation: Deployment	Mooring ID#: DM071A		
<b>Deployed Location:</b> 00 05.412S/95 27.599W <b>Deployed Date:</b> 6/17/2014			
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: T40 failed on deployment.			

<b>Buoy Site:</b> 0 110W REFRESH FLUX	Mooring Depth: 3804m
Mooring Operation: Deployment	Mooring ID#: DM072A

<b>Deployed Location:</b> 00 02.67N/109 54.22W	<b>Deployed Date:</b> 6/21/2014	
<b>Pre-Deployment On Deck Instrument Failures:</b>	None	
Sensors/Equipment Lost at Sea: None		
<b>Sensors Damaged During Deployment:</b> None		
General Comments: Routine deployment.		

Buoy Site: 0 110W ADCP				
<b>Mooring Operation:</b> F	Mooring Operation: Recovery Mooring ID#: EA020			
<b>Deployed Location: 00</b>	01.156N/109 56.203W <b>Deployed Date:</b> 3/29/2013			
<b>Recovered Location:</b> (	<b>Recovered Location:</b> 00 01.15N/109 56.20W <b>Recovered Date:</b> 6/21/2014			
Sensors/Equipment L	ost at Sea: None	·		
Sensors Damaged/Fou	ıled: None			
Fishing/Vandalism: First Vectran spool had abrasions from lone line.				
Sensors/Tubes Downloaded: Sent to lab for download.				
General Comments: NONE				
Site Sensor Failures Date Data Flagged Why Data Flagged Field Service				
			Observations	
N/A	N/A	N/A	N/A	

<b>Buoy Site:</b> 0 110W ADCP	Mooring Depth: 3805m		
Mooring Operation: Deployment	Mooring ID#: EA021		
<b>Deployed Location:</b> 00 00.91N/109 55.82W	<b>Deployed Date:</b> 6/22/2014		
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: None			

Buoy Site: 2N 110W REFRESH					
<b>Mooring Operation:</b> F	Mooring Operation: Recovery Mooring ID#: DM049A				
<b>Deployed Location: 02</b>	2 02.205N/110 03.187W <b>Deployed Date:</b> 3/28/2013				
<b>Recovered Location:</b> (	Recovered Location: 02 02.1N/110 03.3W Recovered Date: 6/22/2014				
Sensors/Equipment L	ost at Sea: Anemometer				
Sensors Damaged/Fou	Sensors Damaged/Fouled: SSC, T20, T40. T2-Clamp broke and slid to 40m.				
<b>Fishing/Vandalism:</b> Marks in the nilspin indicating long line, no line found.					
Sensors/Tubes Downloaded: T60 – TP500 downloaded successfully, No Comms with other					
subsurface sensors.					
General Comments: None					
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service		
			Observations		

SSC	06/13/14	Data missing	Fouled, no comms
RH	04/09/13	Data too high	None
Winds	04/14/13	WDIR erratic	Upper stanchion
			missing, Lost at sea
T20	02/01/14	Data missing	Slid down nilspin to
			40m, fouled, no
			comms
T40	09/15/13	Data missing	Fouled, no comms
T60-T500	06/07/14	Excessive spiking	None

Buoy Site: 2N 110W REFRESH	Mooring Depth: 3758m		
Mooring Operation: Deployment	Mooring ID#: DM073A		
<b>Deployed Location:</b> 02 02.273N/110 01.889W	Deployed Date: 6/22/2014		
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Routine deployment.			

Buoy Site: 5N 110W REFRESH				
Mooring Operation: Recovery		Mooring ID#: DM0	Mooring ID#: DM048A	
<b>Deployed Location:</b> 04 59.66N/110 04.64W		<b>Deployed Date: 3/26</b>	Deployed Date: 3/26/2013	
<b>Recovered Location:</b> (	04 59.706N/110 05.669W	Recovered Date: 6/2	Recovered Date: 6/23/2014	
Sensors/Equipment L	ost at Sea: All Met senso	ors lost at sea.		
Sensors Damaged/Fou	iled: SSC, T20, T40 foul	ed. T20's clamp broke a	nd slid to 40m.	
Fishing/Vandalism: T	ower missing, subsurface	cables ripped in half.		
Sensors/Tubes Downle	oaded: All recovered sen	sors were downloaded s	uccessfully.	
<b>General Comments:</b> H	General Comments: Had to triangulate the buoy to find it.			
Site Sensor Failures	Site Sensor Failures   Date Data Flagged   Why Data Flagged   Field Service			
	Observations			
Buoy	08/07/13	Data missing,	Tower missing, tube	
	transmit failure lost at sea		lost at sea	
Winds 03/29/13		Stanchion collapsed	Tower missing, lost at	
			sea	

<b>Buoy Site:</b> 5N 110W REFRESH	Mooring Depth: 4240m	
Mooring Operation: Deployment	Mooring ID#: DM074A	
<b>Deployed Location:</b> 05 00.029N/110 03.878W	Deployed Date: 6/24/2014	
Pre-Deployment On Deck Instrument Failures: None		

Sensors/Equipment Lost at Sea: None
Sensors Damaged During Deployment: None
General Comments: Routine deployment.

Buoy Site: 8N 110W ATLAS				
Mooring Operation: Recovery		Mooring ID#: QM	Mooring ID#: QM014A	
<b>Deployed Location:</b> 0	8 02.139N/110 09.825W	<b>Deployed Date: </b> 3/	<b>Deployed Date:</b> 3/25/2013	
<b>Recovered Location:</b>	08 02.2N/110 10.0W	Recovered Date: (	Recovered Date: 6/24/2014	
Sensors/Equipment L	ost at Sea: T180	·		
Sensors Damaged/For	ıled: TP300 Slid to 500r	n.		
Fishing/Vandalism: 1	None.			
Sensors/Tubes Downl	oaded: No Comms with	T20, T100. All other s	sensors downloaded	
successfully.				
<b>General Comments:</b> N	Vone			
Site Sensor Failures	Site Sensor Failures   Date Data Flagged   Why Data Flagged   Field Service			
			Observations	
ATMP/RH	05/12/14	Data too high	None	
Winds	10/01/13	WDIR off 30°	None	
SSC	02/26/14	Data missing	None	
T20	11/08/13	Data missing	No comms	
T180	08/27/13	Data missing	Lost at sea	
TP300	04/17/14	Slid to 500m depth	Sensor slid down	
			nilspin to 500m	

Buoy Site: 8N 110W REFRESH	Mooring Depth: 4214m			
Mooring Operation: Deployment	Mooring ID#: DM075A			
<b>Deployed Location:</b> 08 02.17N/110 08.62W	Deployed Date: 6/25/2014			
Pre-Deployment On Deck Instrument Failures: None				
Sensors/Equipment Lost at Sea: None				
Sensors Damaged During Deployment: None				
General Comments: Routine deployment.				

# 2.2 <u>CTD Casts Completed</u>

No CTD casts were accomplished during this cruise.

# 2.3 Ancillary Science Projects Completed on the Cruise

The following outlines the ancillary science work performed in conjunction with the TAO operations on the cruise:

### Pacific Marine Environmental Laboratory (PMEL) Argo Profiling CTD Floats

Eight (8) Argo floats were scheduled for deployment on this cruise. The chief scientist verified and briefed the Operations Officer on the deployment positions prior to the start of the cruise. All Argo Float deployments were completed as scheduled.

Questions concerning ARGO Floats should be directed to:

Gregory Johnson, NOAA/PMEL or Elizabeth Steffen, NOAA/PMEL

Tel: (206) 526-6806 Tel: (206) 526-6747

E-mail: <u>pmel\_floats@noaa.gov</u>

E-mail: <u>pmel\_floats@noaa.gov</u>

The following outlines the Argo floats deployed during the cruise:

ARGO Floats					
Coordinates	Date	SN#	Comments		
03 00.003N 95 00.046W	6/16/2014	0223#2			
00 59.747N 95 16.707W	6/17/2014	F0314			
00 00.042S 95 27.205W	6/17/2014	F0315			
00 00.002N 104 00.000W	6/20/2014	F0316			
00 00.004S 106 59.985W	6/20/2014	F0318			
00 00.104N 110 00.16W	6/21/2014	F0317			
00 59.9N 110 00.1W	6/22/2014	F0319			
03 00.0N 110 00.0W	6/22/2014	F0325			

### Atlantic Oceanographic and Meteorological Laboratory (AMOL) Surface Drifting Floats

Twenty (20) AOML Surface Drifters were scheduled for deployment on this cruise. The chief scientist verified and briefed the Operations Officer on the deployment positions prior to the start of the cruise. All AOML Surface Drifter deployments were completed as scheduled.

Questions concerning AOML Surface Drifters should be directed to:

Shaun Dolk, NOAA/AOML Global Drifter Center, Tel: (305) 361-4546

Fax: (305) 361-4436

E-mail: shaun.dolk@noaa.gov

The following outlines the AOML Drifting floats deployed during this cruise:

AOML Floats					
Coordinates	Date	SN#	Comments		
04 00.000N 95 00.0W	6/16/2014	133234			
03 59.964N 95 00.0W	6/16/2014	133232			
03 00.003N 95 00.0W	6/16/2014	133223			
03 00.003N 95 00.0W	6/16/2014	133227			
02 00.00N 95 18.7W	6/16/2014	133224			
02 00.00N 95 18.7W	6/16/2014	133226			
01 00.00N 95 16.7W	6/17/2014	133216			
00 59.842N 95 16.7W	6/17/2014	133214			
00 00.042S 95 27.205W	6/17/2014	133212			
00 00.042S 95 27.205W	6/17/2014	133219			
00 00.001S 110 00.5W	6/21/2014	133208			
00 00.005S 110 00.5W	6/21/2014	133233			
00 59.9N 110 00.1W	6/22/2014	133215			
00 59.9N 110 00.1W	6/22/2014	133230			
02 01.3N 110 00.2W	6/22/2014	133231			
02 01.3N 110 00.2W	6/22/2014	133217			
03 00.0N 110 00.0W	6/23/2014	133213			
03 00.0N 110 00.0W	6/23/2014	133218			
04 00.0N 110 00.0W	6/23/2014	133228			
04 00.0N 110 00.0W	6/23/2014	133229			